

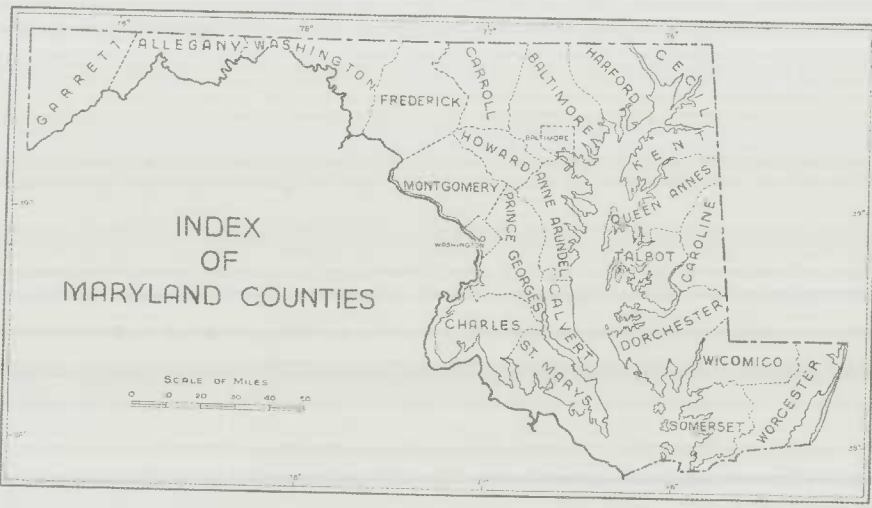
GEOLOGIC MAP OF
CAROLINE COUNTY

State of Maryland
DEPARTMENT OF NATURAL RESOURCES
MARYLAND GEOLOGICAL SURVEY
Emery T. Cleaves, Director

by
John D. Glaser
1998

Scale 1:62,500
1 2 3 4 5 Miles
1 2 3 4 5 Kilometers

Contour interval 20 feet
Numbered ticks indicate the 10-foot face Maryland State Grid
The last three digits of the grid numbers are omitted
Datum is mean sea level



- Qal** ALLUVIUM — Sand, gravel, silt, and clay. Coarser lithologies tan to pale-gray, silt and clay drab, includes some dark-gray marsh deposits. These are heterogeneous, generally water-saturated sediments with mostly lenticular bedding, in places planar or massive.
- Alluvium underlies the channel and floodplain of Marshyhope Creek as well as the upper reaches of the Choptank River and Tuckahoe Creek. These sediments are thin, rarely exceeding 10 feet, and are very poorly exposed. They are the record of streambed and overbank deposition within the past 10,000 years.
- Qtm** TIDAL MARSH — Silt, clay, and minor sand, generally with abundant decaying organic matter, commonly loose and fluid. Dark-brown to dark gray-brown in color. Bedding massive or mottled, upper part permeated with plant roots.
- Tidal marsh deposits mantle extensive low-lying areas bordering the Choptank River and lower Tuckahoe Creek. They are typically overgrown with *Spartina* and other grasses. Thickness in Caroline County not established, but probably less than 10 feet.
- Qp** PARSONSBURG SAND — Sand and subordinate gravel, tan to buff in color. Sand mostly medium-grained, but coarse to granules in places; typically loose and well-sorted in most exposures. Gravel fine to medium, quartzose, commonly grading to pebbly sand, occurring in thin beds.
- The Parsonsburg is restricted in Caroline County to a narrow band on the east side of Marshyhope Creek. The surface of the sand is flat to gently rolling, typically showing loose light-colored sand. In places, low ridges resembling dunes break the surface. Although this unit has been exploited for aggregate in Caroline County as well as in adjoining Dorchester County, no complete thickness was seen in outcrop, nor do any wells or test borings penetrate the complete Parsonsburg section. However, it is notably thin in Dorchester County (14 feet or less), and it is likely that a similar thickness is in Caroline County.
- No fossils were seen in the map area; however, in nearby counties radiocarbon dates on peaty beds thought to be of Parsonsburg age range from 16,000 to 30,500 years B.P. and are Late Pleistocene (Owens and Denny, 1986). The associated pollen suggests cool temperate to cold climatic conditions. Furthermore, the lithology, texture, and geomorphology of the Parsonsburg Sand suggests a largely eolian origin.
- Qk** KENT ISLAND FORMATION — Sand, clayey sand, and subordinate gravel. The sand is mostly quartzose, medium- to coarse-grained, moderately well sorted and loosely compacted. Tan to grayish-orange in color.
- Gravel mostly in the lower portion of the section, chiefly medium-grained but in places coarse with cobbles and boulders to 30 cm in diameter. The Kent Island is typically coarser than the lithologically similar Parsonsburg, with a greater proportion of gravel.
- This formation is present in Caroline County as fluvial terraces on both flanks of the Choptank River valley, and along the west side of Marshyhope Creek. No fossils were found, but the sediments are presumed correlative with those underlying the Kent Island plain of western Talbot and Dorchester Counties and named the Kent Island Formation by Owens and Denny (1986). Outcrops of the unit are generally poor with no more than a few feet of section exposed. A maximum thickness of 24 feet was observed in a test hole that penetrated the underlying Chesapeake Group at a site adjacent to the Choptank River at Two Johns.
- The Kent Island Formation recapitulates in lithology the nearby Pensauken Formation, from which it was presumably evolved into fluvial terraces during late Pleistocene time. Owens and Denny (1986) report a radiocarbon age of 30,000 years B.P., derived from a peat bed in the Kent Island of Talbot County.
- Pensauken Formation**
- Fluvial Facies** — Sand, pebbly sand, and gravel. Sand feldspathic, mostly medium- to coarse-grained, poorly sorted, clayey. Color tan, yellow, or orange to orange-brown where oxidized. Gravel mostly fine to medium, but locally coarse to very coarse with cobbles to 15 cm in diameter. Clasts predominantly quartz with rare metagranite and polynitic sandstone. Ferruginous banding and cementation common. Bedding ranges from massive to flat or cross-bedded. Silt-clay beds thin and rare.
- Estuarine Facies** — Sand and minor pebbly sand. Color pale to dark-gray, whitish where not reduced. Sand mostly fine to medium-grained, rarely coarse-grained, poorly sorted to well-sorted in some beds, generally feldspathic. Pebbles fine to rarely medium. Bedding massive or mottled. Minor silt-clay in thin beds, dark-gray to nearly black, organic-rich with thin lignitic beds in places. Burrow-mottling and discrete burrows common in fine-grained lithologies.
- The contact between this facies and the underlying fluvial facies is gradational.
- The Pensauken Formation underlies all of Caroline County excepting the valleys of Tuckahoe Creek and the Choptank River, both trended into the Chesapeake Group. Pensauken strata were deposited by ancient rivers of the ancestral Delaware System flowing across the Delmarva Peninsula during Late Tertiary time. In Caroline County, Bachman and Wilson (1984) mapped a well-defined paleochannel (see map) trending north-south through the western portion of the County. The thalweg of the channel (Ridgely Paleochannel) is incised to a depth of 30 feet below sea level near Ridgely where the Pensauken is as much as 80 feet thick.
- The eastern part of the County contains several apparently disjoint areas where the uppermost beds of the Pensauken are predominantly drab in color, finer in texture, and exhibit burrows or burrow mottling. These are probable estuarine sediments, correlative in part with Jordan's Sayonville Unit (Jordan, 1967, 1974), and perhaps with the Beversham Formation of Dorchester and Talbot Counties as mapped by Owens and Denny (1986). The contact of the estuarine (?) facies with the underlying fluvial facies of the Pensauken is gradational, and the unit is thin (a maximum seven feet seen in outcrop). For these reasons, and lacking fossil evidence of disparate ages, these beds are best treated as a limited estuarine (?) facies of the Pensauken Formation.
- No fossils were seen in the Pensauken of Caroline County. However, pollen microfossils in Pensauken silt-clay beds near Salisbury contain so-called exotic species (*Pterocarya*, *Engelhardtia*) indicative of Tertiary floras elsewhere. Based on this evidence, Owens and Denny concluded that the Pensauken was Late Miocene in age.
- Tcg** CHESAPEAKE GROUP (undivided) — Sand and clay. Sand, very fine to fine-grained, silty, compact, dark gray-green to bluish-gray, weathering tan or pale gray, locally bearing coarse grains and small quartz pebbles, massive or burrow-mottled. Clay pale-gray to pink, weathering grayish-white; laminated, brittle, and intensely jointed where weathered. These sediments are sparsely fossiliferous with common lenses of shell hash; lignitized wood common.
- These strata are poorly exposed in Caroline County, where outcrops are virtually restricted to the banks of the Choptank River and Tuckahoe Creek. The thickest section exposed totals 45 feet in a bluff on the east side of Tuckahoe Creek, several hundred feet north of the MD 328 crossing. In general, the lithology and associated sedimentary structures of the strata suggest shallow marine to marginal marine depositional conditions. In the Tuckahoe Creek bluff, fine-grained drab burrowed sand at the base of the section grades up into laminated lignitic clay overlain transitionally by poorly-sorted pebbly sand, the whole suggestive of a shoaling sequence.
- Since accurate correlation of these beds with the type Chesapeake Group could not be accomplished, the exact identity and age of these Caroline County beds is unknown. It is reasonable, however, to assume correlation with the Calvert Formation, as the Choptank Formation is known to crop out downriver (i.e. upstream) in Talbot County as Boston cliffs.

REFERENCES CITED

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- Owens, J.P., and Denny, C.S. (1986a) *Geologic Map of Dorchester County*. Maryland Geological Survey, Baltimore, scale 1:62,500.
- (1986b) *Geologic Map of Talbot County*. Maryland Geological Survey, Baltimore, scale 1:62,500.

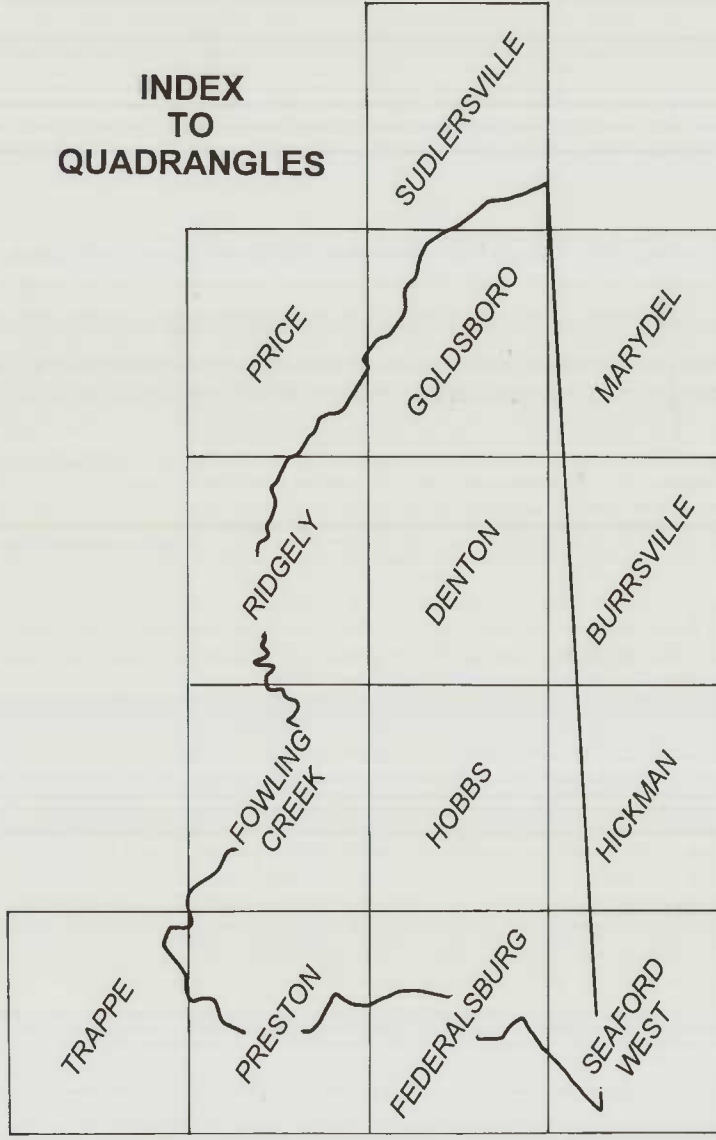
CORRELATION OF MAP UNITS

Qal	Qtm		HOLOCENE
Unconformity			
Qp		UPPER WISCONSIN	QUATERNARY
Unconformity			
Qk		MIDDLE WISCONSIN OR UPPER SANGAMON	PLEISTOCENE
Unconformity			
Tpf	Tpe	UPPER MIOCENE	
Unconformity			
Tcg		MIOCENE	TERTIARY

SYMBOLS

- contact — approximate, gradational, or inferred
- dunes
- data point — water well or test boring

INDEX TO QUADRANGLES



Copies of map available from
Maryland Geological Survey
2300 St. Paul Street
Baltimore, MD 21218-5210

Geologic Cross Section A-A'
Horizontal scale same as map scale

